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In memoriam Albert Verbeek (1946-1990)

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This In memoriam is divided into three parts. The first part is a tribute to Albert Verbeek as a person and a scientist. In the second part, a short note is reproduced, translated from the Dutch, as an example how he applied himself to all kinds of problems. The final part consists of an overview of his major publications.

On September 9, 1990 Albert Verbeek died in Utrecht, The Netherlands. His death was a great loss to his family, his friends, and the scientific community. For many of us, he was a friend and colleague who will be dearly missed, both as a person (he never forgot a birthday), and as a source of inspiration and advice.

One of the driving forces behind Albert's career was his never ending curiosity and interest in the unkown. This is evident from the subjects he became interested in, the papers he wrote, and the jobs he was in. New problems meant new challenges, and no problem was too far away from his interest to be researched, or at least thought about. An example of this is presented in the second part of this tribute. Nearly anyone could come to him with their problems, both scientific and personal, and always he had a willing ear and something valuable to say in a most unpretentious manner. He was a gifted teacher, and helped many students on their way in their career by supervising their theses, advising them on their papers, and setting standards to aim for.

At the same time, he was often convinced that things ought to be done in one way and certainly not in another, and he wanted everybody to know this. His long-standing interest in statistical software and its development inevitably led to strong convictions on its proper design and functioning. His long love-hate relationship with SPSS is evidence of this. He wrote long, long letters to SPSS with their failings and suggested many ways to mend their ways. Later he started using STATA for statistical analysis and graphics on a PC, and sure enough, he wrote them letters too, with long lists of errors and possible improvements. Several (informal) lucid introductions to statistical packages (e.g. BMDP, SPSS, STATA, and GLIM) exist, which are characterized by compact and insightful remarks on how to use these packages to their utmost.

Albert started his career at the Institute of Mathematics of the University of Amsterdam as a research assistant (1966-1969). His choice for this university is reported to be guided by his love for sports especially speed skating, and Amsterdam at the time was the only university town with a full-sized skating rink. As is evident from his publications in that period his prime interest was in topology. His obvious talent for mathematics was rewarded by a research appointment (1969-1972) at the Mathematical Centre in Amsterdam, the research institute for the crème de la crème of Dutch mathematicians. Here he wrote his Ph.D. thesis on *Superextensions of topological spaces* (1972).

In August 1972 Albert took up an appointment at the Department of Mathematics of the University of Canterbury, Christchurch, New Zealand. He intented to stay for at least three years, but he had not anticipated the provincialism of the mathematical scene in New Zealand, and the traditional, conservative way of teaching in New Zealand. For someone as unconventional as Albert, who, for instance, had been an active member of the PSP, a left-wing pacifist party, this must have been difficult to come to terms with. One and a half years later he decided to return to the Netherlands.

After an across-the-world telephone interview, Albert was offered an appointment as associate professor at the Institute of Sociology of the University of Utrecht (1974). Clearly this appointment was not for teaching topology, but rather statistics and research methods. In 1976 he was also appointed at the Institute of Mathematics of the same university, and in that year he became a part-time full professor on a yearly renewable contract. During these years he had a continuous fight with the burocracy of the university, who often deemed it fit to reappoint him several months after the previous term had expired. In addition, at the sociology department itself, he once had to put up with students who voted statistics a subject unworthy of a true sociology student. Albert had no patience with such opinions. Notwithstanding such troubles, he managed to inspire many students and Ph.D. candidates into outstanding work. His commitment to teaching and making people understand the beauty of statistics took many forms, from teaching inspiring courses to organising special statistics seminars, post-graduate courses, and being member of the examination board for the national statistics exams of the Dutch Society for Statistics (VVS).

Albert's research in this period concentrated on many aspects of loglinear and logit models, exact tests in contingency tables, and generalised linear models. He also developed a keen interest in statistical software, and the numerical algorithms used in them. A continuous concern for practical matters and statistical consulting in research prompted him to start a section "From the statistical consultant" in the newsletter of the VVS, to cater for experiences with interesting problems arising out of consultation. This concern took on a different form in his subsequent push to establish an informal (prepublication) journal specifically geared towards applied statistics and data analysis, which would attract contributions from many different disciplines, like social sciences, biology, economics, and medicine. As a result of these efforts *Kwantitatieve Methoden* was started, of which he became the founding editor (1980-

1983).

Even though he never severed his ties with the University of Utrecht, he started looking for a less troublesome job, and from 1982-1985 he was employed at the Netherlands Central Bureau of Statistics (CBS) in Voorburg. There, one of the main projects was the protection of the individual against identification through the CBS data bases. His work at the CBS led to various indices which allowed the CBS to amend their public data bases so that individuals could no longer be traced on the basis of their unique characteristics.

Albert was about to move for the second time in his career to the Mathematical Centre in Amsterdam (1985), when it was discovered that he had a fatal illness. Notwithstanding the severity of this illness, he still managed to supervise several theses and assist many people with their research, and to work on several projects dear to his heart. Just before he died, he was able to finish a project which started in 1979, i.e. the development of fisher, a computer program for exact testing in $r \times c$ contingency tables. This program is now available via the Dutch social science software house iec *Pro*GAMMA. Contacts are still ongoing with the NAG group to include the routines written in connection with the fisher project in the NAG subroutine library. In this period, he also wrote a paper which is the culmination of much work he had done in the field of generalised linear models (*The compactification of generalised linear models*), which appears in the same issue of this journal. Just before he died he managed to demonstrate the high quality of "Cochran's (1952) Rule of Thumb" about the accuracy of the χ^2-approximation in $r \times c$ contingency tables with fixed margins. We hope to be able write up this material as a final tribute to Albert.

His last message to his friends was "I wish I could have stayed a bit longer" (Ik had zo graag nog wat langer willen blijven). Albert, so do we.

Pieter Kroonenberg
Leiden, October 22, 1991

The wet cyclist with chute de pierre

(Answer by Albert Verbeek to a question by Henk Elffers, 12 July 1978)

A cyclist cycles from A to B with speed v. Rain (or a hail of stones) falls from the sky with speed w (vector, for stones usually $\perp$). At t seconds after departure from A (in Dutch: *vertrek*) the cyclist is in I, and is hit by the rain (stones), which at departure was in I - tw (= II):

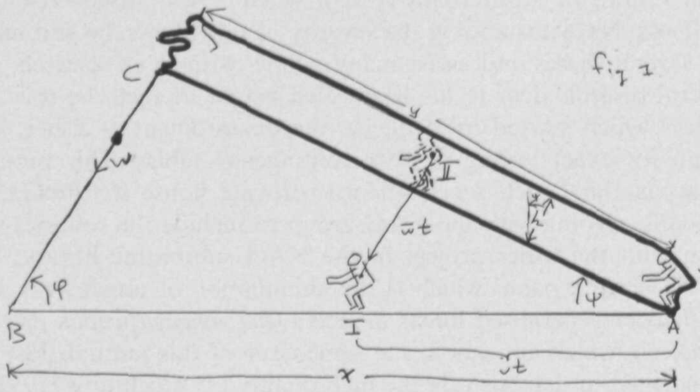

FIGURE 1. A cyclist in the rain (or under threat of falling stones)

For the rain/stones holds: all rain (stones) which is within the heavy lines of Figure 1 at the moment of departure, will fall on the cyclist. The amount of rain, or the probability of being hit by a stone, is therefore proportional to the area within the heavy lines. This area is equal to:

$$yh + \text{surface area cyclist}$$

We will neglect the (debatable and small) term 'surface area of the cyclist'. In order to determine y and h, we first have to determine the information available: v (speed cyclist), w (velocity of rain fall), ϕ (angle of the rain fall, dependent upon wind velocity), and x (distance AB). Hence, 'duration of the cycle trip' = x/v, and 'length of BC' = wx/v. Using these expressions y follows from the cosine rule:

$$\begin{aligned} y^2 &= x^2 + BC^2 - 2BC\,x\cos\phi \\ &= x^2 + \frac{x^2w^2}{v^2} - \frac{2wx^2}{v}\cos\phi \\ &= x^2\sin^2\phi + x^2\left[\frac{w}{v} - \cos\phi\right]^2 \end{aligned}$$

The amount of rain is thus proportional to

$$hx^2\left[\sin^2\phi+\left[\frac{w}{v}-\cos\phi\right]^2\right] \tag{1}$$

where h is defined as the height of the cyclist perpendicular to AC. The direction of AC (and thus the direction of h) depends on the velocity, i.e. the angle between h and the vertical is the angle CAB. This angle follows from ϕ, BC, and AC (using e.g. the sine rule),

$$\sin\psi = \frac{w}{v}\sqrt{1+\frac{(w/v-\cos\phi)^2}{\sin^2\phi}}$$

However, h is difficult to determine as a function of ψ, as this depends clearly on the shape of the cyclist. If we assume a spherical cyclist, h does not depend on ψ, and (1) has the shape of a concave parabola when $\phi<90°$ (before the wind), and the shape of a decending part of a parabola (the faster the less rain) when $\phi\geqslant 90°$ (against the wind); everything as a function of $-1/v$.

To finish off, some sketches of Figure 1 for different v with either $\phi<90°$ or $\phi>90°$:

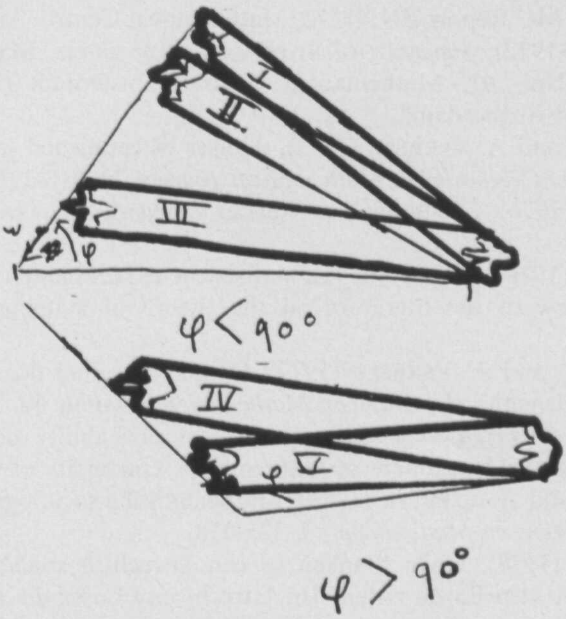

Figure 2. The same cyclist cycling at different speeds under different rain directions $\phi<90°$:
I: v low; II: if h does not depend on ψ then this v is optimal; III very fast v, $\phi>90°$:
IV & V: against the wind: the faster the better - V is the faster speed.

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1992

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